

CALIFORNIA MECHANICAL CODE

GENERAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

FUEL GAS SYSTEMS

The 1998 California Plumbing Code states that in the event of conflicts between different codes, the Plumbing Code takes precedence. The practical result of this for gas piping systems is that the Mechanical Code should not be used, since the subject is covered in detail in the Plumbing Code, and certain conflicts do occur between the codes.

PROHIBITED LOCATIONS

In general, fuel-burning appliances can't be installed in bedrooms, bathrooms or closets, or any room or compartment which opens directly into any of these. However, there are some exceptions:

- 1) This doesn't apply to direct vent appliances, which get combustion air from and vent directly to the outside, usually through a wall.
- 2) Vented appliances such as wall furnaces and gas fireplaces may be installed in these rooms if the rooms contain at least 50 cubic feet of volume for each 1000 Btu's of fuel input.
- 3) A fireplace may be installed in a bedroom or bathroom of any size if it has a listed method of getting its combustion air from outside the building.
- 4) A central furnace compartment may have access through a bedroom or bathroom if all combustion air is obtained from outside the building and the compartment is accessed through a tight-fitting gasketed door with a closer. Please note that this does not apply to water heaters, which are regulated by the Plumbing Code.

ELECTRICAL REQUIREMENTS

Each piece of mechanical equipment must have an electrical disconnect within sight and a 110V receptacle within 25' on the same level as the equipment. Lighting controlled by a switch at the access opening must also be provided for interior mechanical equipment, including attic and underfloor installations.

ACCESS AND WORKING SPACE

Rooms and compartments containing mechanical equipment must have a door at least 24" wide and big enough to remove the equipment. When the door is open, the front or service side of the equipment must have a clear working space of 30" wide, 30" deep, and 30" high or the height of the equipment, whichever is greater.

Attic equipment must be accessible by an opening at least 22" x 30" and big enough to remove the equipment. The passageway from the access opening to the equipment must be at least 30" wide and 30" high, no more than 20' long, and provided with continuous solid flooring at least 24" wide. A level working platform at least 30" square is required at the front or service side of the equipment. This platform may be omitted if the equipment can be serviced and removed from a ladder in the access opening.

Access and working space requirements for underfloor equipment are the same as attic equipment except that the passageway need not be provided with flooring.

Roof-mounted equipment on a single story residence or garage may be accessed by means of a portable ladder. But two-story buildings are required to have "an approved means of permanent access, the extent of which shall be from grade or floor level to the equipment and its level service space. Such access shall not require climbing over obstructions greater than 30" high or walking on roofs having a slope greater than 4 units vertical in 12 units horizontal." A level working platform at least 30" square must be provided at the front or

service side of all roof mounted equipment. If any side of the platform is within 10' of a drop greater than 30", it must "...be provided with a substantial railing not less than 42 inches high and constructed so as to prevent the passage of a 21-inch-diameter sphere..".

SUPPORT OF EQUIPMENT

All mechanical equipment must be supported against vertical and horizontal movement in accordance with the engineering provisions of the Building Code. This is sometimes a problem with attic furnace installations, where the unit is not rigidly attached to the structure. Lateral bracing must be provided, typically straps running at a 45° angle from each corner of the unit to rigid framing members and tight enough to prevent horizontal movement. Concerns about vibration must be addressed with isolation devices, not by omitting required supports. The rafters or trusses must also be designed to handle the additional weight of the equipment.

"Piping, electrical conduit, ductwork, vents and the like shall not be used to provide support or restraint of equipment."

ELEVATION OF IGNITION SOURCE

Equipment which has a flame, generates a spark or uses a glowing ignition source open to a garage in which it is installed must be elevated at least 18 inches above the floor. When such equipment is enclosed in a separate compartment having access only from outside of the garage, it may be installed at floor level, providing the required combustion air is taken from the exterior of the garage.

CRASH BARRIERS

Equipment regulated by the Mechanical Code must be protected when placed in the drive path directly in line with a garage vehicle door or if outdoors and subject to vehicular impact. This is usually done with one or more 4" trade size steel pipe bollards, embedded at least 12" into concrete.

HEATING AND COOLING SYSTEMS

COMBUSTION AIR

Permanent openings must be provided to supply combustion air to most fuel-burning appliances. Exceptions are direct-vent appliances, listed cooking appliances, and domestic clothes dryers.

An adequate supply of combustion air can be obtained from infiltration into a building of ordinary tightness if the volume of the room containing the appliance has at least 50 cubic feet of volume for each 1000 BTU's of fuel input. Hallways or other rooms which are permanently open to the room containing the appliance may be included in the volume calculation. Doors are not permanent openings.

If the volume of the room is not sufficient, all or part of the combustion air must be provided from another source. This includes permanent openings to another part of the building which has adequate volume, and openings or ducts directly to the outside or to accessible attics or underfloor spaces if they are adequately vented to the outside. If outside air must be used, the room or space containing the appliance becomes unconditioned space and must be separated from conditioned space in the building with insulated walls, weatherstripped doors, etc. This is usually done by putting the appliance in a small compartment.

Outside combustion air can be provided by openings directly through walls, floors or ceilings, or by ducts. Two openings or ducts are generally required, one within 12" of the ceiling and one within 12" of the floor. If all combustion air is taken from outside the building, it may be provided through a single opening or duct within 12" of the ceiling.

If a duct is used to supply combustion air to the top of the enclosure, it must extend horizontally or upwards to the source of air. A duct supplying air to the bottom of the enclosure can run in any direction. Upper and lower ducts must be completely separate to the source of combustion air.

If permanent openings are used to obtain combustion air from another part of the building, they must each have 1 square inch for each 1000 BTU's of fuel input or 100 square inches, whichever is more.

If combustion air is being taken from outside or from the attic or underfloor space, each opening or vertical duct must have at least 1 square inch for each 4000 BTU's of fuel input. Horizontal ducts must have at least 1 square inch for each 2000 BTU's of fuel input. If a single upper opening or duct is being used, it must have at least 1 square inch for each 3000 BTU's of fuel input.

VENTS AND CHIMNEYS

Unvented fuel-burning appliances used for space heating are prohibited in residences.

Single wall pipe may be used only as a connector between an appliance and its vent or chimney and only in an exposed location. It can't be used in an attic, or in any concealed space. When used with residential gas appliances, it must be kept at least 6" from combustible materials and for woodstoves at least 18". All joints in single wall connectors must be fastened with sheetmetal screws or rivets, including the connection to the chimney or vent.

Concealed portions of vents and chimneys, other than masonry or concrete chimneys, must be constructed with listed pipe and fittings and must maintain the listed clearance from combustibles. In the case of gas appliances, listed pipe and fittings will be double-wall, or B-vent and generally require 1" clearance from combustibles. For woodstoves, a variety of listed chimney systems is available. These generally require 2" clearance from combustibles. Requirements for the installation of all these factory-made systems are found in the manufacturer's installation instructions, not in the code books. Requirements for masonry chimneys are in the Chapter 31 of the 1998 California Building Code.

Pitch is important in gravity venting systems, since the tendency of heat to rise makes them work. If too much

of the pipe is too flat, the system will stall. Connectors may be as flat as 1/4" rise per foot, but must be as short as possible. Beyond the connector, no part of a gas vent can be flatter than 60° from vertical. But the total horizontal run of connector and vent must not exceed 75% of the total vertical rise. Stated another way, the vent system must be more vertical than horizontal. This is sometimes a problem when people want all the vents toward the back of the roof where they can't be seen from the street. If an appliance is too far toward the front of the house, this may not be possible.

Gravity-type venting systems, other than a Type BW system or a venting system, which is an integral part of a listed appliance, must extend at least 5 feet above the appliance vent collar. A Type BW vent serving a wall furnace must extend at least 12' above the bottom of the furnace.

Since gas vents must terminate at least 8' from any wall or other vertical surface, they are normally extended above the (highest) roof, clear of all walls. The termination must be at least 3' above or 10' horizontally from any forced air intake, such as an evaporative cooler. The minimum height above the roof is shown in Table 8-A from the 1998 California Mechanical Code

TABLE 8-A VENT TERMINATION ABOVE ROOF

ROOF SLOPES	FEET-INCHES
Flat to 6/12	1-0
Over 6/12 to 7/12	1-3
Over 7/12 to 8/12	1-6
Over 8/12 to 9/12	2-0
Over 9/12 to 10/12	2-6
Over 10/12 to 11/12	3-3
Over 11/12 to 12/12	4-0

Woodstove chimneys must terminate in accordance with the manufacturer's installation instructions, generally 3' above the point of penetration and 2' above any part of the building within 10'.

Integral vents, or vents built into outdoor equipment, must terminate at least 4' from a door or openable window.

Venting a gas appliance into a masonry chimney is allowed if all the following conditions are met:

- 1) The manufacturer's installation instructions allow it.
- 2) The chimney must be inspected and found to be clean and safe.
- 3) The cross-sectional area of the chimney flue must be no more than 4 times the area of the vent connector. If the chimney is too large, the exhaust gases can cool to the point where they won't rise.
- 4) The chimney must be lined, or if not, it can't have more than one side exposed to the outside.
- 5) A cleanout must be provided near the bottom of the chimney.

Condensing appliances must be vented in accordance with the manufacturer's installation instructions.

CONDENSATE

Liquid condensate from condensing appliances and cooling coils must be piped to an approved plumbing fixture or disposal area. Such piping must be no smaller than the drain pan connection on the approved appliance, must be corrosion resistant (normally PVC) and sloped at least 1/8" per foot. When condensate is generated above usable space, a separate overflow drain must be provided, sloped at least 1/8" per foot, and discharging at a "readily observable" location. An example of such a location is directly above a door or window. The purpose of locating the outlet in this manner is to alert the building occupant that something is wrong if the

primary drain becomes clogged.

DUCT SYSTEMS

Ducts must be installed at least 4" above earth. This applies to metal ducts and flexible ducts. Supports must be at least 1 1/2" wide and be placed at intervals recommended by the manufacturer, but no more than 4' apart.

Risers must be constructed of metal in duct systems serving more than two stories.

WALL FURNACES

When wall furnaces are installed in existing buildings, the wall on one side of the vent must be completely opened for installation and inspection. The wall cavity containing the vent must be free of obstructions, and the plates at the top of the cavity must be cut flush with the studs.

The top of the wall in the story containing the furnace must have ceiling plate spacers, which allow ventilation into the attic or wall cavity above. The top of any walls above the story containing the furnace must have firestop spacers, which close the opening around the pipe. Both types of spacers must be listed parts of the venting system.

If the story containing the furnace has an attic above with sufficient height, a sheetmetal sleeve the size of the wall cavity must extend from the top of the wall cavity to a point above the attic insulation. But it must keep back from the roof sheathing at least 2" to allow adequate air circulation.

If the story containing the furnace has an attic above without sufficient height to provide adequate ventilation of the wall cavity, ventilation may be provided by a ventilated roof flashing or a ventilation opening in the wall directly above the furnace and no more than 12" from the ceiling.

WOOD-BURNING STOVES AND FIREPLACES

Wood stoves and factory-built wood-burning fireplaces must be installed according to the manufacturer's installation instructions. Wood stoves usually have a specification plate attached to the back which gives the required clearances from combustibles and floor protection. If no plate is present and no installation instructions are available, the stove cannot be installed in the City of San Bruno.

EXHAUST SYSTEMS

Exhaust ducts for bathroom fans, range hoods, and clothes dryers must terminate outside of the building at least 3' from an openable window, door or property line. A backdraft damper must be provided.

Range hood ducts must be of metal and have smooth interior surfaces.

Clothes dryer ducts must be of metal and have smooth interior surfaces, except that a maximum 6' length of flexible connector may be used within the room or space containing the dryer. Unless the manufacturer's installation instructions say otherwise, 14' of duct with two 90° elbows is the maximum length allowed. Two feet of length must be deducted for each elbow in excess of two. Joints in dryer ducts must not be connected with sheetmetal screws or other fasteners which will obstruct the flow.

When a compartment or space is provided for a dryer, an exhaust duct must be provided. If the dryer is located in a confined space, a permanent opening of at least 100 square inches must be provided for makeup air.